

# Coal Reserves and Coal Mine Economics of the Crowsnest Pass

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## *Executive Summary*

The Crowsnest Pass coal reserves are smaller than those in the Elk Valley in BC and the quality is less suited for steel making than the Elk Valley coals. These facts raise questions about the economic feasibility and longevity of the proposed mining. The Grassy Mountain Mine will be a typical swing mine (like Grand Cache), operating when prices are high and shutting down as soon as the price drops. Environmental costs for clean-up and reclamation of coal mining are high. The Crowsnest Pass will be better served, economically and environmentally, by concentrating on alternative industries such as tourism, recreation, and renewable energy.

## *Introduction*

Benga Mining Limited, a subsidiary of Riversdale Resources Limited, is proposing to construct and operate an open-pit metallurgical coal mine approximately seven kilometres north of Blairmore, a community in the Crowsnest Pass in southwest Alberta. As well, Montem and Atrum are exploring for new coal mines in the Crowsnest Pass area.

This report documents the coal reserves of the Crowsnest Pass and it assesses the economic feasibility of these potential coal mines.

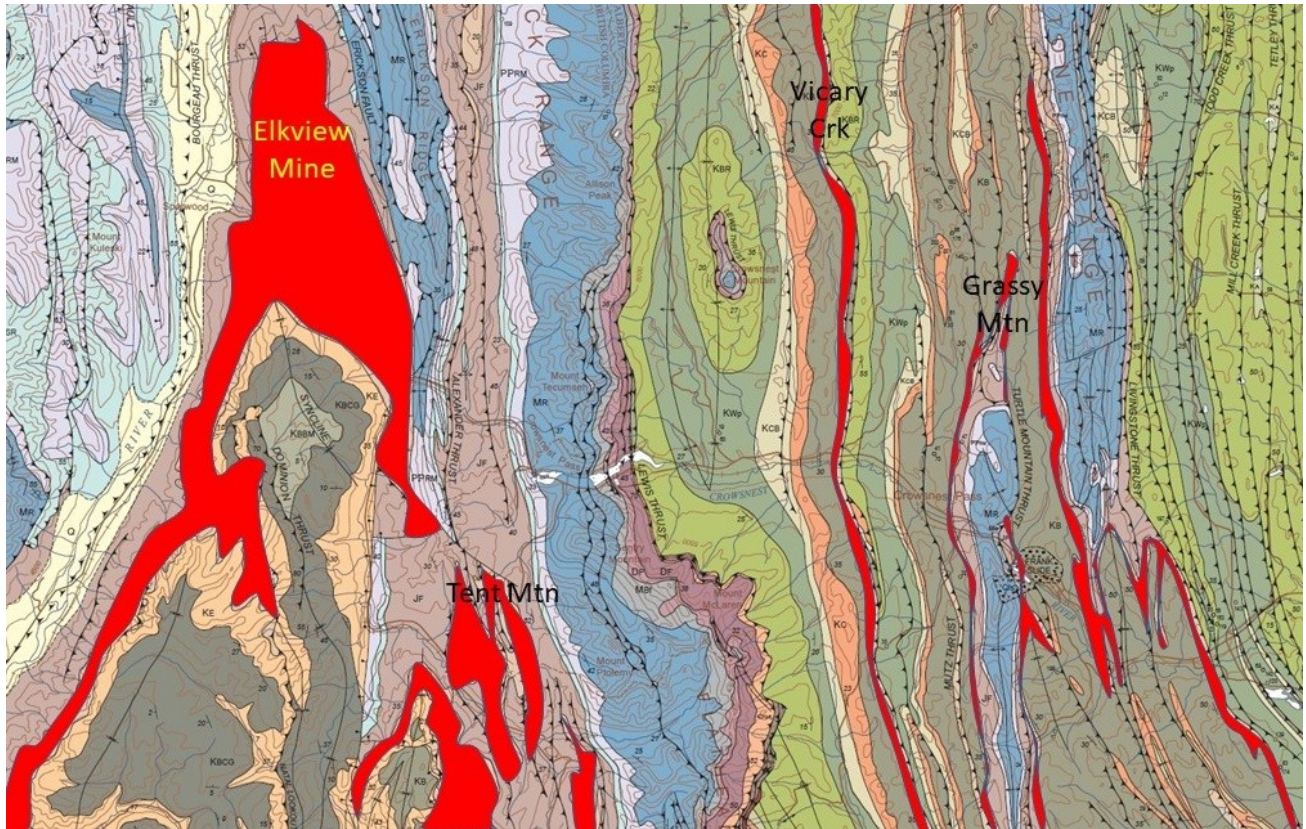
## *Reserves*

Reserves of metallurgical coal (also known as coking coal), which is essential for making steel, are present in the Crowsnest Pass in the Mist Mountain Formation of the Kootenay Group (Macdonald *et al.*, 1989). The extent of the coal bearing Mist Mountain Formation is shown on the map of Figure 1.

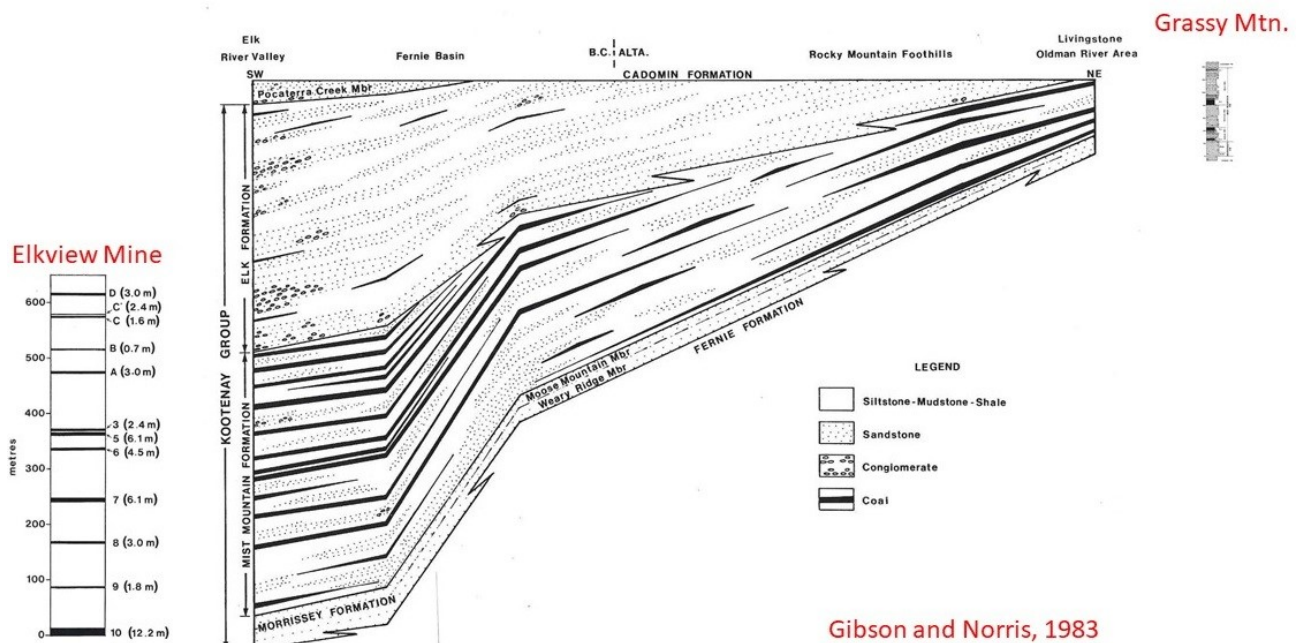
Figure 2 is a cross section of the Kootenay coals from Sparwood, BC to Burmis, AB. It shows that a 600 meters thick section in the Sparwood area diminishes to 100 meters in the Burmis-Blairmore area. This explains the large areas of coal in the west as compared to the thinner bands of coal in the east on the map of Figure 1.

In the Elk Valley, Teck Resources has four coal mines. According to Teck Resources, these mines have a total yearly production of 25 million tonnes of coal and have reserves of 625 million tonnes for at least 25 years of mining.

In the Crowsnest Pass area, according to Benga Mining, there are reserves of 92 million tonnes in the Grassy Mountain area. Montem has reported a reserve of 13 million tonnes in the Tent Mountain area and the possibility of 104 million tonnes (an indicated resource) in the Chinook Vicary and Chinook South areas.



**Figure 1.** Geological map of the Crowsnest Pass with the coal bearing Mist Mountain formation highlighted in red (from Price, 2011).

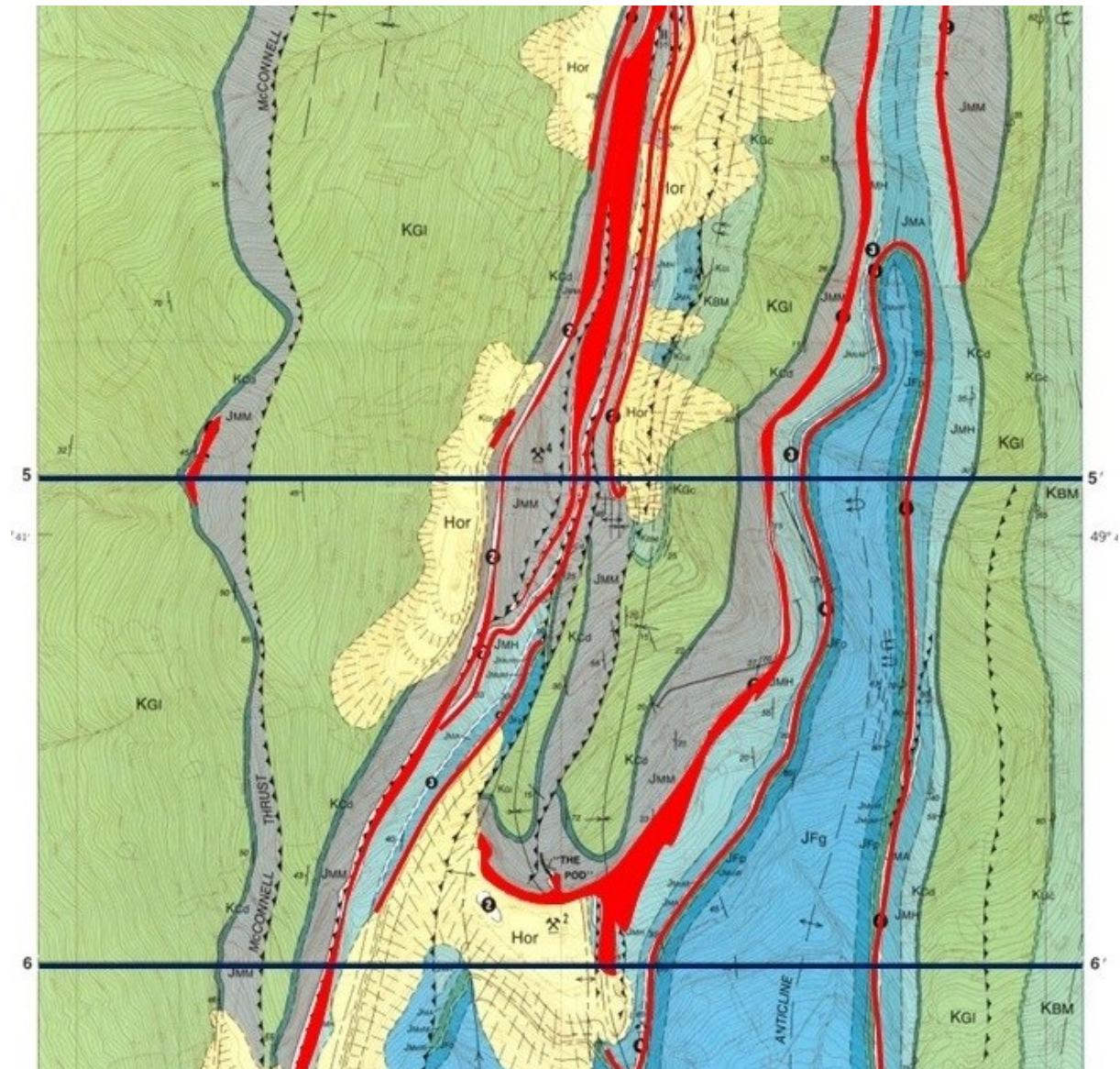


**Figure 2.** Cross section of Kootenay coals (in black) from Sparwood (BC) to Burmis (from Gibson *et al.*, 1983).



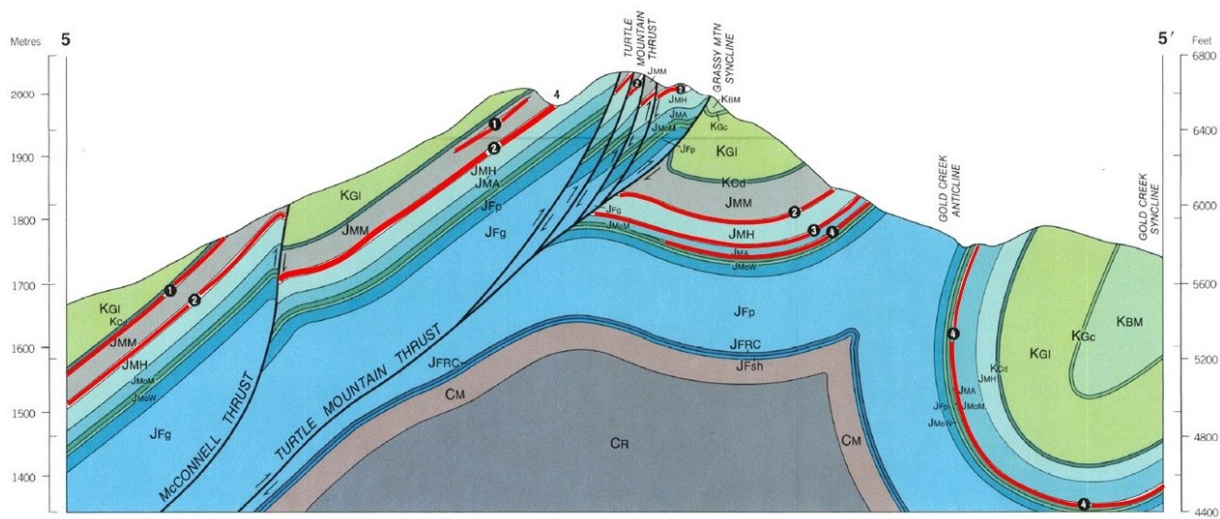
The total reserve in the Crowsnest Pass is 209 million tonnes of coal, of which half is an indicated resource. This is a good indication that the reserve amount is inaccurate, and consequently more exploration will be needed to determine an accurate reserve. Atrium has just started its exploration. Thus, the Crowsnest Pass coal reserves are much smaller than those in the Elk Valley.

Benga's Grassy Mountain is the most advanced project in the Crowsnest Pass area. It has three economic coal seams: #1 Seam, #2 Seam and #4 Seam. The geological map of the proposed main mining area is shown in Figure 3.

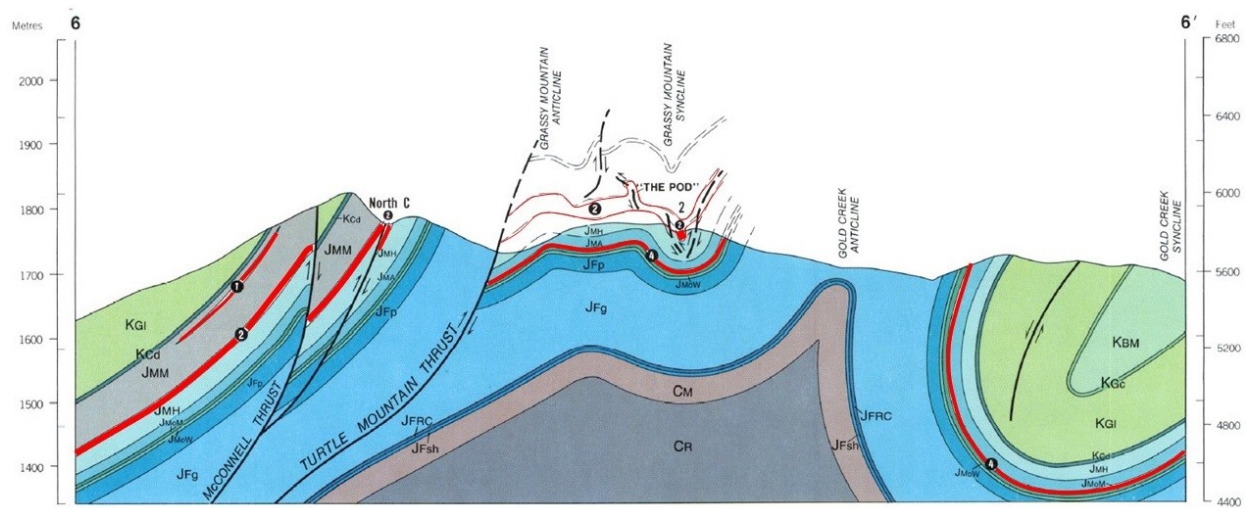


**Figure 3.** Geological map of the main proposed mining area of Grassy Mountain. Coal seams are red and indicated by their seam number. Seam #3 is a split of Seam #4. The lines of cross sections 5 and 6 are shown (from Norris, 1994).

In Figures 4 and 5, two vertical cross sections through this area are shown.



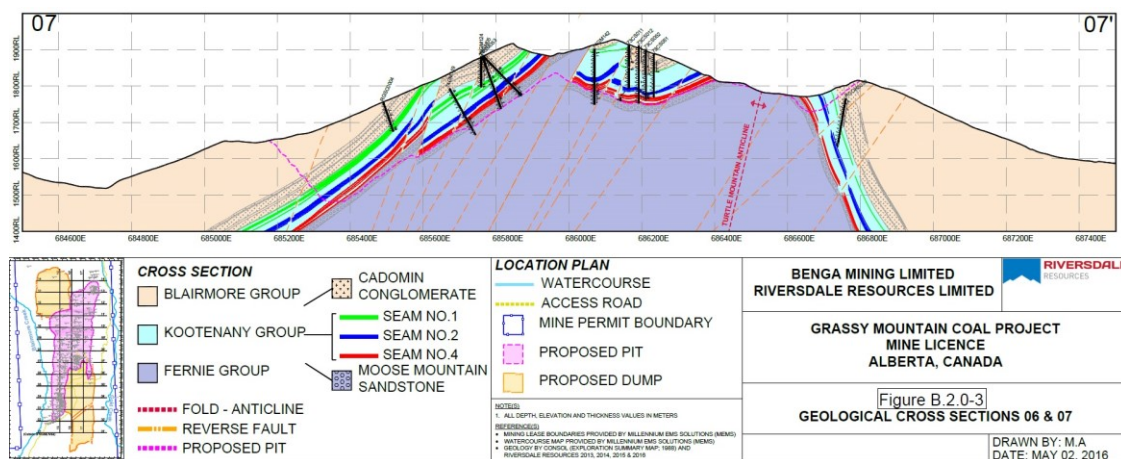
**Figure 4.** Cross section 5-5' through Grassy Mountain. It shows the discontinuity of Seam #1. The line of section is given on Figure 3. (from Norris, 1994).



**Figure 5.** Cross section 6-6' through Grassy Mountain. The line of section is shown on Figure 3. The structure of 'The Pod' (also known as the Big Show) is shown (from Norris, 1994).

Figure 4 shows that Grassy Mountain is a faulted anticline (upfold) and shows the discontinuous nature of the #1 Coal Seam. This discontinuity suggests uncertainty about the reserves of #1 Seam coal. Figure 5 shows the structure of the thickened pod van #2 Seam, which is also known as the Big Show. Figure 6 shows Benga Mining's cross section of the same area as the cross section in Figure 5. Although this cross section is based on additional drilling in recent years, the detail of the thickened pod of the #2 Seam is not shown.





**Figure 6.** Benga Mining’s cross section at the location of Cross Section 6. The presence of a pod is not clear.

The total established reserve of 92 million tonnes of coal for Grassy Mountain is comprised of 16 percent of #1 Seam, 50 percent of #2 Seam and 34 percent of #4 Seam (source: Benga Mining).

## Coal Quality

The quality of Grassy Mountain’s metallurgical coal is inferior to Elk Valley’s Prime Hard Coking Coal products.

Most of the Grassy Mountain coal appears to be lower value Tier-2 coking coal (Koliijn, 2021). Coal seam #1 has the best coking quality of the three Grassy Mountain seams. When the small amount of coal in #1 Seam (16% of coal reserve) has been depleted, the remaining 84% of the lower quality coal in #2 Seam and #4 seam will be what is left for mining.

The coal quality of the Montem project in the Tent Mountain area and of the Atrum project in the Chinook Vicary and Chinook South areas appear to be mostly Tier-2 coking coal or even less in quality. However, more exploration is required before an accurate estimate on the coal quality can be given.

## Economics

Alberta’s coal resources are a risky source of coking coal. The Grassy Mountain mine is unlikely to provide significant tax and royalty revenues and consistent employment at the levels predicted by Benga.

Royalties in Alberta are lower than in BC and the rest of the World. Alberta received \$4.1 billion in oil and gas royalties in 2019 and only \$12 million from coal. Benga Mining’s prediction of \$30 million in royalties per year is highly unlikely.

The International Energy Agency (IEA) predicts that globally at least 25 percent less metallurgical coking coal will be needed in the next 25 years. Several steel making plants using green hydrogen instead of coking coal are already in operation and more will follow. Global climate action will also push down long-term demand for coal in steelmaking. For this reason, boom and bust (especially bust) can be predicted for a possible coal industry in the Crowsnest Pass.

Coal pricing on the international market is highly volatile and markets for Crowsnest Pass coal might disappear.

Due to its low quality, it might be among the first jurisdictions to become uneconomic. Therefore, it is advisable to consider the impact of Benga Mining entering bankruptcy around year 10 of project life, potentially leaving a \$48 million gap between the Mine Financial Security Asset-to-Liability Program and clean-up costs at year 10.

What will the people, who live in the Crowsnest Pass and those who move to the Crowsnest Pass to work for the mine, do if the mine goes bankrupt in 10 years?

The Crowsnest Pass might be better served by concentrating on alternative industries such as tourism, recreation, and renewable energy.

### *Environmental Impacts*

Environmental costs for clean-up and reclamation are sizeable in mountain areas.

Alberta already has \$260 billion in oil and gas liabilities (which includes \$30 billion mine liabilities), and which are largely not covered by the industry. Is it economically prudent to add billions of dollars more in liabilities from foreign mining companies to develop coal mines? What happens if these companies become bankrupt and leave Alberta without paying for the environmental clean-up and reclamation?

Furthermore, water is a valuable resource and renewable if managed carefully. Irrigation adds \$3.6 billion to Alberta's GDP. A compromised water supply from coal mining will impact all southern Alberta, as well as Saskatchewan's and Manitoba's water security.

Finally, who will pay for the health issues arising from the coal dust in the air and for the psychological stress caused by noise pollution?

### *Conclusions*

Mining metallurgical coal in Alberta's Eastern Slopes is considered uneconomic. The coal reserves of the Crowsnest Pass are 17 percent of the reserves in the Elk Valley. The Grassy Mountain Mine will be a typical swing mine (like Grand Cache), operating when prices are high and shutting down as soon as the price drops, and the Crowsnest Pass will be left with a big hole.

It is hard to put a price on the value of Alberta's mountains. Are Alberta's Eastern Slopes priceless? Is anything less than a total prohibition of coal mining on the Eastern Slopes acceptable for Albertans?

The Crowsnest Pass will be better served, economically and environmentally by concentrating on alternative industries such as tourism, recreation, and renewable energy.

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